

**HUMAN DENTITION FROM THE AKARI SITE, MADANG, PAPUA NEW GUINEA,
WITH OBSERVATIONS ON THE OLDEST KNOWN INTERPROXIMAL TOOTH
GROOVE IN AUSTRALMELANESIA**

Christy G. Turner II*

This brief report describes the human teeth recovered during excavations at the Akari site, a midden of marine shells located about nine km inland from present-day Hansa Bay on the north coast of Papua New Guinea.

The osteological sample reported here was kindly made available for study by Pamela Swadling, Curator of Prehistory, Papua New Guinea National Museum and Art Gallery, in January 1990. A report on the Akari site has already been published in *IPPA Bulletin* 11 (Swadling *et al.* 1991:104-7). The site contains marine shells and artefacts, and has yielded radiocarbon dates of approximately the sixth millennium BP from its lower, preceramic, layer. The general condition of these adult teeth is excellent, suggesting that the organic portion of the dentine is intact and could be used for dating purposes if necessary.

THE AKARI DENTITION

The morphological and other observation and scoring procedures used herein follow the Arizona State University dental anthropology system (Turner *et al.* 1991). As there are no incisors or incisor sockets it is not possible to say if Australian-like dental ablation or Indonesian-like tooth filing or other modification had been practiced. But importantly, one adult male (?), number 559, had an activity-induced interproximal groove on the distal aspect of the right lower first molar, making this grooving example the oldest one I am aware of in Australmelanesia.

None of the teeth in this small sample is carious, suggesting a diet relatively free of highly-processed sticky carbohydrate foodstuffs such as taro. However, because of the generally pronounced occlusal wear, presumably due to grit-contaminated foods like shellfish or earth oven preparations, the opportunity for caries formation may have been limited.

In addition to severe dental wear, there are a number of teeth with chipped occlusal surfaces. The heavy wear is not distinctive, and could have occurred in either hunting-gathering or agricultural societies, depending on average expected lifespan. The rather frequent tooth chipping is more distinctive, suggesting that foodstuffs were contaminated with mineral grit, or that these individuals used their teeth repeatedly in harsh task activities. Tooth chipping occurs more often in hunter-gatherers than in agriculturalists. For example, it is rather common in Australian Aborigines, both coastal and interior-dwelling (Turner and Turner 1991). The small amount of morphological information that could be gleaned from these highly worn teeth is insufficient for reliable affinity assessment, although there is no suggestion that the Akari people were non-Melanesians.

INDIVIDUAL SPECIMENS

Akari/A Spit 1, JMF 558. This find is a single caries-free tooth which appears to be an upper molar. Because the crown is worn completely away (grade 3-4 wear), I am not absolutely certain which tooth it is, or even if it is human. Chipping is present on the buccal root surface, indicating that the tooth had shifted lingualward in life. Since there is no alveolar bone associated with the tooth, it is not possible to say whether the tilting was associated with weakened socketing due to alveolar abscessing.

Akari/A Spit 3, JMF 559. This specimen is a fragment of the right side of a mandible with three teeth in place (second premolar and first two molars) and two empty sockets (first premolar and third molar lost after death). It represents an adult, possibly male. The fragment is too small to determine if the jaw was of the "rocker" type. The teeth have no caries, but the first molar has occlusal chipping. Periodontal disease is medium, and there is a periodontal pocket at the first molar, but no abscessing. There is no expression of mandibular torus (grade 0), and no congenital absence of the second premolar or third molar. The second premolar and first molar crowns are worn into the pulp chamber (grade 2-3), and the second molar cusps are worn off completely (grade 2). The first premolar had one root and grade 2 Tome's expression. The second premolar has one root and no enamel extension on to the root. The first molar has the Y groove pattern, no protostylid (grade 0), a long enamel extension (grade 3), and two roots. The second molar has the X groove pattern, no deflecting wrinkle (grade 0), no distal trigonid crest (grade 0), and no protostylid (grade 0). It too has a grade 3 enamel extension and two roots.

There is a shallow but broad groove worn into the distal aspect of the Akari 559 first molar near the crown-root junction (Figure 1). The groove does not extend across the entire distal surface, only the half nearest the buccal or cheek surface. There is a sharp edge to the groove at the intersection of the distal and buccal surfaces. The mesial surface of the second molar is unmodified.

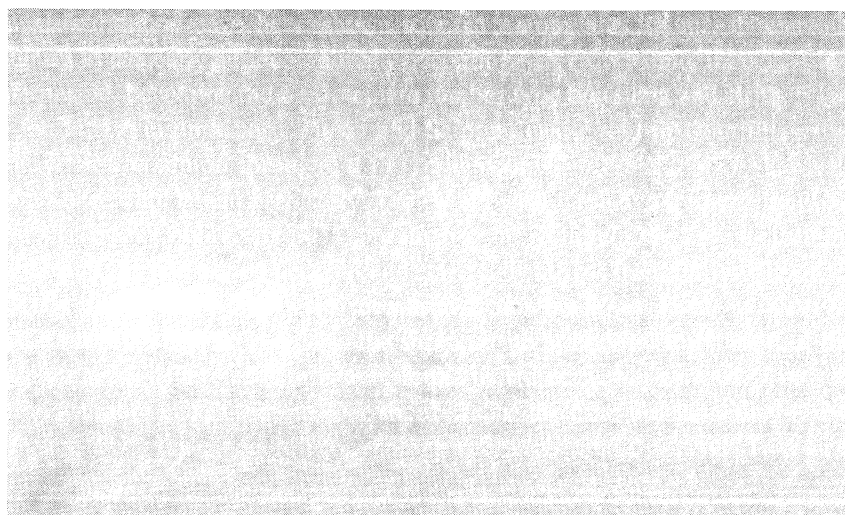


FIGURE 1: AKARI 559 PHOTOGRAPHED FROM DISTAL ASPECT, SHOWING THE SHARP BUCCAL EDGE OF THE GROOVE.

While the sharp edge might have resulted from sinew production, it seems more likely that it would have formed from the repeated abrasion of some less flexible material such as bone or wood. Obviously, as Brown and Molnar suggest, some experimentation is needed to aid the interpretation of interproximal grooves (CGT neg. no. 12/6-27-90).

Brown and Molnar (1990) have recently suggested that interproximal grooving was caused by processing sinew thread, rather than being the result of long-term toothpick use as is generally held by most workers who have dealt with this condition (for a recent review and bibliography of this long-standing controversial topic see Frayer 1991). Brown and Molnar made their suggestion on the basis of ethnographic films of Australian Aboriginal sinew production, and on the common occurrence of interproximal grooves in an early 19th century skeletal series from South Australia. Although Brown and Molnar do not describe their sample of interproximal grooves in complete detail - that is, they do not indicate if grooves occur across the entire distal surface, or if they are partial as in Akari 559 - their pioneering use of ethnographic film as a source for explaining this worldwide and ancient interproximal dental artifact offers far more potential for explanation than all the previous speculation. If the South Australian grooves were worn into the entire distal (or in rare cases, mesial) surface, their suggestion of sinew production would be quite reasonable as one causal mechanism. But, it is difficult to identify how the Akari 559 partial groove could have resulted from the working of sinew because the length, depth, striations, semi-circular section, location, and especially the sharp instead of rounded buccal border of the Akari 559 distal groove would seemingly have resulted from the habitual abrasion of a firm probe or pick, instead of more flexible

animal sinew or plant fiber. Whatever the mechanism, the Akari 559 interproximal groove is the oldest example I know of from Australmelanesia.

Akari/A Spit 3, JMF 560. Only a single upper right first premolar represents this adult of indeterminable sex. The cusps are almost worn off (wear grade 1-2) but not so much so as to obscure the fact that the tooth lacked accessory mesial and distal cusps. It also lacks the Uto-Aztec form, known to occur mainly in American Indians. The occlusal surface is chipped but caries-free. There is no sign of any cultural treatment. There is one root with three radicals and a bifid tip.

Akari/A Spit 4, JMF 561. This adult is represented only by a slightly worn (grade 1-2), caries-free, right lower canine. The single root has two radicals. There is severe hypoplastic pitting on the remaining crown buccal surface, suggesting some sort of childhood health problem at around four to six years of age.

Akari/A Spit 5, JMF 562. All that remains here is a worn root tip (grade 4). It could be an upper molar root remnant, and it seems to be human.

Akari/A Surface, JMF 563. This possibly female adult is represented by the largest fragment in this series, a left half of a mandible from the canine to the third molar, the latter having been lost before death. The remaining teeth are free of caries but are heavily worn. Only a root stump remains for the canine (wear grade 4), the cusps are worn off of the first premolar (grade 2), the pulp is exposed on the second premolar (grade 2-3), more so for the first molar (grade 3), and less for the second molar (grade 2). The premolars and molars have chipped occlusal surfaces. There are no abscesses, and only the third molar had some periodontal disease. There are no signs of any cultural treatment, and no supernumerary teeth are or were present. There is no mandibular torus (grade 0). The canine has one root with two radicals. Both premolars have one root and no enamel extensions. The first molar has two roots with four radicals and no enamel extension. The second molar has the X groove pattern, no distal trigonid crest (grade 0), no protostylid (grade 0), no cusp 7 (grade 0), no enamel extension, and two roots. The teeth are relatively small.

Akari/B Spit 2, JMF 564. This appears to be an upper molar, whose crown is completely worn away. The root form is similar to that of 558.

Akari/B Spit 3, JMF 565. This adult is represented by a single lower left canine root whose crown was broken off, seemingly after death. The root is not bifurcated and has two radicals.

Akari/B Spit 4, JMF 566. Like 564 and 558 this specimen has the crown completely worn off. The tooth seems to be an upper molar.

Akari/B Spit 4, JMF 567. The last specimen is a caries-free upper left second premolar with minimal wear (grade 1). The crown lacks accessory mesial or distal cusps, has no odontome, and is not of the Uto-Aztec form. The tooth has only one root and two radicals. There is no sign of any cultural treatment.

In sum, the modest amount of morphological information that could be observed in the Akari teeth in no way suggests non-Melanesian affinity. The wear, chipping, and oral health are consistent with tooth use activity in a hunting and gathering lifeway, although the severe wear may have prohibited caries formation that would signal consumption of heavily processed carbohydrate foodstuffs originating from agricultural products such as taro. The most interesting feature of the Akari series is the presence of an interproximal tooth groove --apparently the oldest known for Australmelanesia.

REFERENCES

- Brown, T., and S. Molnar. 1990. Interproximal grooving and task activity in Australia. *American Journal of Physical Anthropology* 81:545-553.
- Fruyer, D.W. 1991. On the etiology of interproximal grooves. *American Journal of Physical Anthropology* 85:299-304.
- Swadling, P., N. Araho and B. Ivuyo 1991. Settlements associated with the inland Sepik-Ramu sea. *Bulletin of the Indo-Pacific Prehistory Association* 11: 92-112.
- Turner, C.G.II, C.R. Nichol and G.R. Scott. 1991. Scoring procedures for key morphological traits of the permanent dentition: The Arizona State University dental anthropology system. In M.A. Kelley and C.S. Larsen (eds), *Advances in Dental Anthropology*, pp. 13-31. New York: Wiley-Liss.
- Turner, C.G.II, and J.A. Turner. 1991. Report to Wenner-Gren Foundation for Anthropological Research on project: Teeth and prehistory in Australmelanesia. September. Report in possession of authors.